

A machine for piercing sheets of material in a variety of patterns using an adjustable
apparatus

U.S. Patent Application of:
Diana Amelia Normington.

"Express mail" mailing label number

EE 093284007 US

Date of Deposit: 11/5/2003

I hereby certify that this correspondence, including the
attachments listed on the accompanying New Utility Patent
Application Transmittal, is being deposited with the United
States Postal Service "Express Mail Post Office to Addressee"
service under 37 CFR 1.10 on the date indicated above and is
addressed to

Mail Stop Patent Applications

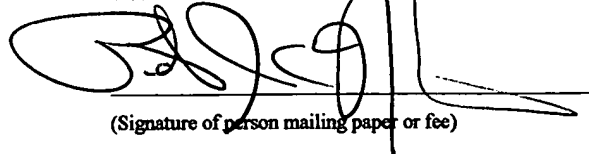
Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450.

Peter J. C. Normington

(Typed or printed name of person mailing paper or fee)



(Signature of person mailing paper or fee)

Title of the Invention

A machine for piercing sheets of material in a variety of patterns using an adjustable apparatus

Cross Reference to Related Applications

This application is based on provisional application serial number 60/426,141, filed on November 13, 2002.

Statement Regarding Federally Sponsored Research or Development

Not Applicable

Description of Attached Appendix

Not Applicable

Background of the Invention

This invention relates generally to the field of arts and crafts specifically paper punching and more specifically to a machine for piercing sheets of material in a variety of patterns using an adjustable apparatus.

The use of hand actuated paper punches has a long history of use both for business and for various types of arts and crafts. Paper punches are used to form shapes in paper by cutting away a section of the paper using a cutting die designed to make a smooth cut and further designed with a specific geometry for that cut. Along with the cutting die, paper punches use a matching hole on the other side of the paper being

punched to allow the cutting die to pass completely through the paper while the hole and base of the frame with the hole hold and support that paper. The hole must be closely matched to the size and geometry of the cutting die to provide for a smooth cut.

In addition, the cutting die must be manufactured with a set of edges that form the cutting surface and are located at an angle to the paper being punched to also insure a smooth cut.

The initial use for paper punching was to punch circular holes in paper that was then mounted in binders with a corresponding rings to hold that paper. Such binders usually with three rings to hold the paper are in wide use throughout the world in business. Similar punches are used in schools to compile the work pages of students.

Soon various artists realized that the cutting die or paper punches could be designed in various geometries and shapes to form special cutouts such as stars, circles and a myriad of other shapes and items. Currently there are a large variety of decorative paper punches used in a number of arts and crafts.

The configuration of the punch itself changed. Initially, paper punches looked much like a pair of pliers where the mechanism was held in the hand and paper placed between the cutting die and the base and then the handles squeezed to punch the paper. A spring was placed between the handles to return the punch to the open position when the punching operation was completed. Three hole punches often used a lever to allow the user to push down on that lever and move the three cutting dies down and punch through the paper with a spring again returning the punch to the open

position after the paper was punched.

Then the punch configuration changed to a button attached to the cutting die and held along with the return spring in a frame. A slot was provided in the frame to insert the paper to be punched and the button was pushed down to punch the designed pattern into that paper.

The next configuration for the paper punches uses a thumb-actuated lever to push down on the cutting die and punch out the pattern. This configuration is contained in United States Patent 5,749,278.

Both the push button punch and the thumb-activated lever punch are produced in a large variety of patterns by a number of suppliers. They are used in the arts and crafts industry in a number of applications. The punches vary in size as well as the pattern to be punched. As punches grew in size, it became more difficult to push on the push button to punch through the paper. Helper systems were developed to assist in the use of the larger punches and to make it easier to punch a large number of patterns. These helpers are hinged arms that hold the punch and provide more leverage to the user of avoid fatigue and to punch larger patterns.

Although the punches were originally designed and are still labeled as paper punches, various users found that these punches could be used to punch patterns in a variety of materials in sheet form. These include: coated papers, plastic sheets, metallic foil sheets, special clays, leathers and others. As long as the material was in a sheet form thin enough to fit into the punch, it could be punched into the pattern designed into that

punch.

The major problem with all existing punches is the lack of flexibility. The punch can only punch out the designed pattern. The resulting piece can then be used as a decorative element in some type of craft and/or the resulting hole in the sheet of material could be the decorative element. There was no way, for example, that a flower pattern could be partially punched out of a sheet of material with the petals cut out, but the center left in the sheet of material.

Brief Summary of the Invention

The primary object of the invention is to provide an adjustable decorative punch that partially punches out a pattern in a sheet of material when properly adjusted. This punch can also be adjusted to fully punch out the pattern as with existing punches. With this punch, it would be possible to partially punch out a flower pattern leaving the center attached to the sheet of material and the petal cut free. This would then provide a new and large variety of possible arts and crafts projects using this invention.

Another object of the invention is to make the adjustable apparatus easy to use, precise and easily manufactured using the same materials as used to make existing punches.

Another object of the invention is to allow the adjustable punch to be used with a variety of material types, thickness and qualities.

A further object of the invention is to provide an adjustable apparatus that will work with all of the currently available punch configurations and could be provided as a retrofit kit to existing punches.

Still yet another object of the invention is to provide a reliable and cost effective adjustable apparatus.

Other objects and advantages of the present invention will become apparent from the following descriptions, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed.

There is disclosed a machine for piercing sheets of material with an adjustable apparatus that can be moved by hand where the adjustable apparatus acts as a stop to the moveable cutting die containing the punch pattern thereby varying the amount of the punch pattern cut into a sheet of material being punched. The moveable cutting die is designed with a cutting surface so that the adjustable apparatus can limit the amount of the sheet of said material cut by the cutting surface. The adjustable apparatus can also be moved to a position so that the designed pattern of said punch is cut fully out of a sheet of material by the movement of the moveable cutting die. There is a frame which holds the adjustable apparatus and the moveable punch cutting die with the moveable cutting die held in the top of the frame and a hole aligned to the moveable cutting die in the base of the frame.

In accordance with a preferred embodiment of the invention, there is disclosed an adjustable apparatus that can be added to existing decorative punches where the

adjustable apparatus acts as a stop to the moveable cutting die containing the punch pattern.

Brief Description of the Drawings

The drawings constitute a part of this specification and include exemplary embodiments to the invention, which may be embodied in various forms. It is to be understood that in some instances various aspects of the invention may be shown exaggerated or enlarged to facilitate an understanding of the invention.

Figure 1 is a cross sectional view of one variation of the invention showing a push button type of punch.

Figure 2 is a perspective view of the variation of the invention shown in Figure 1.

Figure 3 is a side view of another variation of this invention with a punch assist device added to the push button type of punch.

Figure 4 is a cross section view of another variation of the invention with multiple slots for the sheet of material.

Figure 5 is a side view of another variation of the invention where the punch action is activated by a lever.

Figure 6 is a perspective view of the variation of the invention shown in Figure 5.

Figure 7 is a side view of still another variation of the invention where the punch action is achieved by squeezing the handles held in the hand.

Detailed Description of the Preferred Embodiments

Detailed descriptions of the preferred embodiment are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure or manner.

A preferred embodiment of the invention is shown in FIG 1 where the threaded push button **145** of a machine **100** also has a matching threaded ring **130** placed on this threaded push button **145** forming an adjustable stop **135**. The threaded ring **130** and the threaded push button **145** together comprise an adjustable apparatus. The threaded ring **130** can be rotated around the threaded push button **145** moving up and down the threaded push button **145** and thereby limiting the motion of the threaded push button **145**. As the threaded push button **145** is pushed downward using the top **110** it pushes down a moveable cutting die **140** with a cutting surface **142** designed to cut a particular pattern into a sheet of material held in the slot **181**. The cutting surface **142** is at an angle to the sheet of material to make a sharp and uniform cut through that sheet of material. The hole **185** at the lower portion **180** of the machine **100** matches the particular pattern of the moveable cutting die **140** which also assists in making a sharp and uniform cut. Because of the angles formed on the cutting surface **142** of the moveable cutting die **140** and the ability to use the threaded ring **130** to limit the motion of the push button **145**, it is possible to have the machine **100** only cut out a portion of

the particular pattern designed into the cutting surface **142** of the moveable cutting die **140**. This leaves the sheet of material pierced with a part of the particular pattern of the cutting surface **142** of the moveable cutting die **140**. For example, if the particular pattern was a flower, then the sheet of material might have only the petals of that flower design cut into that sheet of material. The threaded adjustable ring **130** and the threaded push button **145** are manufactured so that the threaded adjustable ring **130** can be placed in a position so that the complete particular pattern can be fully punched out of the sheet of material if so desired.

In the view shown in FIG 1 can be seen more detail of the construction where a spring **141** is used to return the moveable threaded push button **145** to the original starting position following the piercing or punching of a sheet of material. Once that sheet of material is processed as desired, then it can be removed from the slot **181** by rotating the base **180** of the machine **100** using the hinge **170** thereby freeing up the sheet of material for easy removal. The slot **181** is designed to accept a variety of thickness of sheets of material while the cutting surface **142** of moveable cutting die **140** is designed to cut a variety of materials. The upper portion **160** and the lower portion **180** hold and align the moveable cutting die **140** and the matching hole **185** and form a frame. A housing **150** completes the machine **100** and secures the threaded push button **145** against the action of the spring **141**.

It can be noted in FIG 1, that the cutting surface **142** is manufactured with that cutting surface **142** at an angle to the sheet of material being processed. This feature is common to all such machines and is similar in operation to the angled cutting action

seen in a pair of scissors as they are used to cut. The cutting surface **142** can be formed in a straight line at an angle to the sheet of material or as a curved surface at an angle to the sheet of material.

The hole **185** in the lower portion **180** as illustrated in FIG 1 is also critical to a smooth and sharp cut. That hole **185** must duplicate the pattern in the moveable cutting die **140** so that the cutting die **140** fits precisely into the hole **185** thereby providing the necessary shearing action like a pair of scissors.

In operation a sheet of material is placed in the machine **100** and the top **110** of the threaded push button **145** depressed with the threaded ring **130** at its highest point on the threaded push button **145**. The amount of the machine **100** pattern cut into that sheet of material is monitored by slowly pushing down on the threaded push button **145** until the desired cut in that sheet of material is achieved. Then the threaded ring **130** is turned down along the threaded push button **145** until it stops any further downward motion of that push button **145**. It may take several iterations until the desired effect is achieved by the user. Once that final adjustment is made with the threaded ring **130**, then other sheets of material can be processed by the machine **100**. At any time, the threaded ring **130** can be moved to another position and a different amount of the pattern of the machine **100** cut into a sheet of material.

Once a cut has been made, it is necessary to remove or move the sheet of material for another cut. Since the sheet of material may be only partially cut, removal is difficult with the cut portions of the sheet of material caught up in the hole. One solution as

shown in FIG 1 is a hinge **170** that can release the lower portion **180** of the machine **100** thereby making removal of the sheet of material easy. Another embodiment would be to make the base capable of being snapped apart to ease the removal of that sheet of material. Still another option would be no hinge **170** or no ability to snap apart the machine **100**. Then the user would carefully push down on the cut portion of the sheet of material and then remove it from the machine **100**.

FIG 2 shows an external view of the machine **100** where the key feature of the threaded push button **145** and the matching threaded ring **130** can be easily seen and compared with prior art paper punches which do not have such features.

As prior art punches have been developed and gotten bigger, the craft industry has developed aids to make it easier to use such punches. These aids are important for large punches or for punching stronger sheets of material. Such aids consist of an assembly where the punch is placed inside and the assembly has a long base and a long moveable arm which the user uses to push down on the push button of a prior art punch. The long arm increases leverage and makes the prior art punch easier to use.

FIG 3 illustrates the concept of this invention applied to such an aid where an adjustable threaded element **310** is added to the aid **300** which has corresponding threads manufactured into that aid **300** thereby forming an adjustable apparatus. This machine **300** allows for conventional prior art punches to have an adjustable feature. In use the prior art punch is placed in the machine **300** and the moveable arm **320** pushed down on the prior art punch. The adjustable threaded element is then turned to form a stop to the motion of the moveable arm **310** thereby controlling the

motion of the prior art punch and establishing the adjustable feature of this invention.

FIG 4 shows another embodiment of the invention where a second slot **481** below the first slot **181** has been added to the machine **100** shown in FIG 1 along with a second lower portion **480** below the first lower portion **180** and a second hole **485** below the first hole **185** thereby forming a new machine **400**. With this configuration, the first slot **181** can be used to hold a sheet of material where the pattern of the machine **400** is completely punched out while the second slot **481** is used to hold a sheet of material where the pattern is only partially punched and the machine **400** is used as described above in the operation of machine **100** with all of the features and options previously described.

As the field of paper punches has evolved, a new style of punch has been developed. This style is shown in US Patent 5,749,278. This punch uses a thumb actuated lever to create the action of the punch. The adjustable apparatus of the invention can be seen in FIG 4 where a threaded element **530** has been incorporated into a thumb actuated punch thereby forming machine **500**. A matching threaded portion **535** is incorporated into the housing **550** where the threads of that portion **535** match to those of threaded element **530** and thereby form the adjustable apparatus of the invention. In use a sheet of material is placed in the slot **581** and the lever **520** pushed down to actuate the punch. The threaded element **530** is then turned either up or down to form a stop to the action of the punch and cut the desired pattern into the sheet of material. As shown in FIG 5 a hinge **570** is incorporated into machine **500** to allow for the lower portion **580** to be moved away from the housing **550**. This then makes removal of the sheet of

material easier. As an option the punch could be manufactured with a snap apart lower portion **580** or with that lower portion **580** fixed to the housing **550**.

FIG 6 shows another view of the invention where a threaded part **560** is added as a retrofit to a previously manufactured thumb actuated punch. The operation of the machine **500** is otherwise identical to that described above.

FIG 7 shows another embodiment of the invention where the adjustable element **730** is incorporated into a punch where a sheet of material is placed into slot **750** and the upper handle **720** and the lower handle **725** are squeezed together rotating around hinge **770** pushing the cutting die **785** through a matching hole in the center support **790** and on through the sheet of material and a corresponding hole in the lower portion **780**. The adjustable element **730** is turned up or down to form the desired pattern in the sheet of material. That adjustable element **730** moves through a hole in the center support **790** when the upper handle **720** and lower handle **725** are squeezed and stops when it contacts the lower portion **780**. The adjustable element **730** and the lower portion **780** form the adjustable apparatus of this invention.

While the figures have shown threaded elements to form the adjustable stops of this invention, there are other possible ways to form such stops as would be obvious to anyone skilled in the art. This could include items such as shims of various thickness which would be particularly appropriate for the thumb actuated punches.

While the invention has been described in connection with a preferred

embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.
